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ABSTRACT

An informal study was conducted of the courses selected by ninth grade students who later dropped out of high school. Longitudinal data were available for high school students in the Austin (Texas) Independent School District, from 1978-79 to 1982-83. The courses selected by high-risk students in ninth grade, including extracurricular activities such as band and sports, were examined for a relationship to dropping out. Discriminant analysis was used, classifying students according to grade point average, sex, ethnicity, and involvement in serious disciplinary incidents. Those with the greatest risk of dropping out were identified. Courses were divided into three categories: above average, average, or below average in holding power. Classes with above average holding power included Spanish, introductory algebra, world history, dance, photography, biology, drawing and painting, and varsity sports. Courses with below average holding power included drama, Spanish for native speakers, fundamentals of mathematics, field sports, and electronics. It was noted that high risk students enrolling for band remained at higher risk than those who participated in varsity sports. Due to the informal nature of this study, it is suggested that conclusions should be drawn cautiously. (GDC)

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NINTH GRADE COURSE ENROLLMENT AND DROPPING OUT

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NINTH GRADE COURSE ENROLLMENT AND DROPPING OUT

During the 1983-84 school year a committee appointed by Texas Governor Mark White and chaired by computer magnate H. Ross Perot traveled the state of Texas holding hearings on educational reform. Student involvement in extracurricular activities was one of the areas of greatest interest to the committee. Concern spread throughout the fine arts and sports faculties with the realization that curbs might be placed on student involvement in those activities. The teachers argued that fine arts and sports keep students in school who might otherwise drop out. Extracurricular activities give students a reason to go to school. Our office was asked informally to look at whatever we might have in data to support or refute this argument.

The previous year, we had completed a study of dropouts in our district (Davis and Doss, 1982; Doss, 1983a; Doss, 1983b). As a result we had a file of longitudinal information on all students who were 14 years of age in our district in 1978-79. The data followed their progress in the district through the fall semester of 1982-83. As part of the dropout study we had found through discriminant analysis that a number of centrally available variables were related to the prediction of which students might drop out. With the results of the discriminant analysis we could identify students who were at risk of dropping out when they entered ninth grade. With our district's computer files of courses taken by each student we would be able to look at their course selection in ninth grade. Therefore, we decided to examine the courses taken by high-risk students in ninth grade to look for relationships between courses selection and dropping out.

The logic went like this. We had a group of students who would be predicted to drop out of school. We knew the percentage of this population who would in fact drop out. If a course tended to keep students in school, then the percentage of high risk students taking that course who actually dropped out should be less than the population average. Or the converse could be true. If a course tended to abet the dropout process, then the students taking the course should drop out at a higher rate than the population of high-risk students on the average. The logical flaw in this is obviously that students are not randomly assigned to courses. It could be that students who select particular courses predictive of dropping out or staying in may differ in some important ways from the average high-risk student so that the observed relationship has nothing to do with the courses. Such a cause-and-effect relationship as the argument implies must be viewed with great skepticism. However, the demonstration of a strong relationship between course enrollment and dropping out would be of interest even if the reasons behind the relationship were not clear. At worst the study had heuristic value.

The Study

Classification function coefficients from the discriminant analysis were used to calculate classification scores for each student enrolled in the ninth grade in 1978-79. Attachment B describes the discriminant analysis. The classification functions were based on the previous year's grade point average, sex, ethnicity, and involvement in serious discipline incidents. Those students with greater classification scores for dropping out than for staying in were included in the analysis. For each course, the number of course enrollments for the year were accumulated. AISD followed the quarter

system at that time, so the number of enrollments is about three times the number of students. The percentage of enrollments associated with students who did not drop out was determined for each course as well as the mean score of the enrolled students on the dropout classification score.

The proportion staying in was compared with the population value by calculating a z-score by the formula below.

$$Z = \frac{A - B}{\sqrt{\frac{A * (1 - A)}{N}}}$$

A is the proportion of the enrollments associated with staying in for the course. **B** is the proportion of the population who did not drop out, and **N** is the number of enrollments in the course. Courses were divided into three groups--above average, average, or below average in holding power--based on the obtained z-scores. If z-scores were ≥ 1.96 or ≤ -1.96 ($p < .05$), classes were labeled as above average or below average in holding power respectively. Table 1 lists the classes with enrollments greater than 10 and/or significant z-scores. Six courses had z-scores greater than 1.96: Spanish, introductory algebra, world history, dance, varsity sports, and photography. Seven had scores less than -1.96: drama, Spanish for native speakers, fundamentals of math, field sports, and electricity/electronics.

The mean classification score listed in the table provides an index of the degree to which a course attracts students with an increased likelihood of dropping out. The lower the value, the greater the chance of dropping out.

A substantial number of the students in the dropout study were below the ninth grade at age 14, and a number of ninth graders failed to advance to the tenth grade the next year. Therefore, the study was repeated using students who were in the ninth grade in 1979-80 to see to what extent the results would hold up under somewhat different conditions. The results are provided in Table 2. Only four course areas--biology, drawing/painting, Spanish for native speakers, and varsity sports--were associated with staying in. Four course areas--earth science, industrial crafts, ROTC, and study hall--were associated with dropping out. **Varsity sports was the only course associated with staying in school in both analyses.**

What Does it Mean?

That is hard to say. This study was done almost "for the fun of it." Given the grossness of the measure and the study's logical and methodological problems, it is surprising that anything came out significant. However, a few observations come to mind from examining the results.

As mentioned previously, the self-selection of the students into some courses may be behind the relationship to dropping out or staying in. However, sometimes the teacher probably makes the difference. The hypothesis tested with the z-score is whether the obtained percentage of enrollments associated with staying in school is equal to the population value. The larger the number of enrollments the easier it would be to detect a small impact of a course. Conversely, the smaller the enrollment,

the greater the difference must be to be significant. With larger enrollments, more teachers are likely to be involved and the impact of any one teacher is much reduced. However, with small enrollments, the impact of any one teacher becomes more strongly confounded with the impact of the course.

Several of the courses with significant z-scores had enrollments of less than 50. Take the examples of drama and Spanish. Thirty-two enrollments by high-risk students were found for drama. The average classification score was 180.6. Twenty-nine enrollments were noted for Spanish, and the average classification score was 180.6. Therefore, the number of students and their relative risk were about the same for the classes. However, the percentage associated with staying in school was 38% for drama and 76% for Spanish. Given the small enrollment and the similar classification scores, could the difference have been in the teachers? We cannot say for sure, but it is certainly a possibility.

Sometimes the course itself may contribute to dropping out or staying in. Take, for example, fundamentals of mathematics with 711 enrollments compared with introductory algebra with 335 enrollments. Their classification scores of 181.5 and 182.0 respectively suggest that slightly more capable students were taking fundamentals of mathematics; however, the difference in the rate of students staying in school (14% and favoring introductory algebra) suggests that something about the differences in the courses may have been important. It may be that the challenge of the new material in introductory algebra was of greater interest to these high-risk students than a repetition of the same old material in fundamentals of mathematics.

To return to the courses of original interest to the study, it is interesting to note the z-scores that band and varsity sports had in Table 1, -1.665 and 4.306 respectively. Both are extracurricular activities that require extensive participation by the students. Why the difference in z-scores? Perhaps these factors may be important...

1. Relatively fewer high risk students enroll for band compared with varsity sports. There were 79 band enrollments in Table 1 and not enough to list in Table 2. The enrollments for varsity sports were 103 in Table 1 and 27 in Table 2. If you assume that the number of students in the band is generally more than on a varsity sports team, it raises the possibility that the high-risk student may be in more of a minority in band and, therefore, feels more "out of place" there compared with a team. But probably more importantly, varsity athletes are more select students in the sense that they represent a small proportion of the student body of an urban high school. Furthermore, they participate in an activity valued highly by the school. Such a situation provides a high level of success and a strong motivation to go to school.

2. The relatively smaller number of students on a team means that a high risk student is a more significant part of the sports team than the band. His or her loss would mean more to the team. Add to that the fact that the job security of the coach is probably more dependent upon the success of his or her charges than is that of the band director, and it seems reasonable to hypothesize that the coach may provide more individual assistance and attention if a student indicates a tendency to leave school.

3. High risk students who enroll for band are generally at greater risk than those who enroll for sports.

All in all it appears that the varsity sports have more to offer the high-risk student than does the band.

Conclusion, Caution, and Suggestion:

This is not a clean study. It was conceived, conducted, and written up very quickly, with minimal resources, and without time for close scrutiny. Subsequently it has not been possible to do a follow up study in a more defensible manner. The study does provide some support for what many people believe strongly, namely that participation in varsity sports encourages students to stay in school; however, the reader is encouraged to treat the results with caution.

Course	N	Percent Stay-In	Z	Holding Power: Below Average	Holding Power: Average	Holding Power: Above Average	Classification Score*
General Business	20	.55	- .449		X		182.8
Typing	221	.66	1.756		X		182.2
Grammar	417	.59	- .616		X		181.8
Composition	282	.61	.219		X		181.3
Literature	287	.60	- .024		X		181.7
Reading	133	.62	.392		X		182.6
Speech	10	.20	-3.162	X			181.7
Drama	32	.38	-2.629	X			180.6
Spanish	29	.76	1.996			X	180.8
Spanish for Native Speakers	50	.44	-2.279	X			180.3
Homemaking--Food	58	.47	-2.053	X			182.5
Homemaking-Clothing	25	.56	- .403		X		181.4
Homemaking-Family Living	27	.52	- .847		X		181.1
Fundamentals of Mathematics	711	.55	-2.758	X			181.5
Introductory Algebra	335	.69	3.416			X	182.0
Algebra	61	.70	1.797		X4		183.5
Physical Science	1,017	.61	.501		X		182.0
Biology	36	.69	1.230		X		179.2
World Geography	1,014	.59	- .728		X		181.8
World History	44	.80	3.214			X	179.5
Drawing/Painting	65	.55	- .749		X		180.8
Crafts	22	.45	-1.370		X		180.1
Band	79	.51	-1.665		X		180.3
Chorus	36	.67	.849		X		184.2
Physical Conditioning	457	.57	-1.341		X		181.8
Field Sports	128	.51	-2.086	X			183.3
Soccer	29	.55	- .523		X		178.7
Wrestling/ Gymnastics	66	.67	1.149		X		182.9
Badminton, Golf, Tennis	110	.56	- .769		X		179.8
Dance	49	.84	4.484		X		181.9
Recreational Sports	57	.56	- .587			X	180.4
Varsity Sports	103	.78	4.306			X	184.1
Industrial Crafts	75	.51	-1.617		X		182.0
Drafting	31	.61	.147		X		183.0
Electricity/ Electronics	23	.35	-2.539	X			189.2
Metalworking	52	.62	.228		X		181.9
Photography	27	.82	2.874			X	180.6
Plastics	35	.69	1.092		X		180.5
Woodworking	108	.57	- .545		X		181.3
Driver Ed.	52	.63	.518		X		179.3
Study Hall	38	.45	-1.892		X		181.4

*The smaller the value the greater the risk of dropping out.

Table 1: RESULTS FOR HIGH RISK STUDENTS IN GRADE 9 IN 1978-79. Proportion in the population not dropping out = .60.

Course	N	Percent Stay-In	Z	Holding Power: Below Average	Holding Power: Average	Holding Power: Above Average	Classification Score*
Typing	23	.61	- .013		X		159.2
Grammar	78	.56	- .817		X		160.9
Composition	70	.60	- .171		X		162.5
Literature	77	.65	.724		X		162.0
Reading	41	.56	- .633		X		159.8
Spanish for Native Speakers	16	.88	3.205			X	162.8
Fundamentals of Mathematics	187	.60	- .309		X		160.5
Introductory Algebra	55	.67	.991		X		106.6
Physical Science	157	.56	-1.249		X		159.1
Biology	73	.77	3.176			X	163.8
Earth Science	19	.37	-2.183	X			168.4
World Geography	170	.56	-1.191		X		159.2
World History	40	.68	.878		X		162.9
Drawing/Painting	15	.87	2.924			X	157.1
Physical Conditioning	57	.58	- .475		X		159.2
Field Sports	50	.60	- .144		X		162.9
Badminton, Golf, Tennis	36	.56	- .657		X		158.7
Varsity Sports	27	.81	2.740			X	157.8
Industrial Crafts	34	.44	-1.983	X			166.0
ROTC	11	.09	-5.989	X			154.6
Study Hall	21	.33	-2.690	X			157.3

*The smaller the value the greater the risk of dropping out.

Table 2: RESULTS FOR HIGH RISK STUDENTS IN GRADE 9 IN 1979-80. Proportion in the population not dropping out = .61.

Attachment A: The Discriminant Analysis

Creation of the Data Set

The dropout file included all students who attended an AISD school during part or all of the 1978-79 school year and who were at least 14 but not 15 years old on September 1, 1978. Enrollment data for each year until the fall of 1983 were collected from the Student Master File. Test scores, special education status, and other variables were collected from other files. Students who entered the District in subsequent years were not added to the file.

An important variable on the file was the "drop code." It was determined through an examination of the student's permanent record card at the school. All students who left the District and did not return were given a drop code to show why they left. The values of the code are given below:

Blank = A graduate or a student currently enrolled.

0 = A student whose transcript had been requested by another school district or school. A transfer student.
1 = A dropout, a student for whom we could find no evidence that he or she had attended another diploma-granting institution.
2 = Other leaver, a student who died or who became associated with an organization that might grant a high school diploma such as the armed services or the Texas Department of Corrections.
3 = A student who left Lanier High School before the school recorded transcript requests on permanent record cards.
4 = Status Unknown (usually no permanent record card could be found).

The Discriminant Analysis

Discriminant analysis was used to determine how well dropping out could be predicted from readily available information in the District computer files. The students included in the analyses were limited to those with drop codes of "blank" or "1;" i.e., nonleavers (graduates and those currently enrolled) and dropouts. The variables chosen for the analyses were those available at the beginning of the 1978-79 school year (the year they should have entered the ninth grade): sex, ethnicity, grade point average, and the number of serious discipline incidents from the previous school year as listed in the discipline file maintained by the Office of Student Affairs. Ethnicity was entered as three binary variables--

Hispanic: 1 if Hispanic; 0, otherwise.

Black: 1 if Black; 0, otherwise.

Other: 1 if other than Hispanic or Black;
0 if Hispanic or Black.

The analyses were run using the SPSS DISCRIMINANT program on the University of Texas CDC Dual Cyber system. A stepwise discriminant analysis was used with the order of entry determined by the variable which would give the largest Mahalanobis distance between the two groups. Special education students were omitted from the analyses because their grade and GPA values were probably different in meaning from those of the other students.

Five of the variables entered the discriminant function--grade point average, grade, the variable for Black ethnicity, the number of discipline incidents, and sex. The overall canonical correlation was .51. Figure A-1 gives the order in which the variables entered the analysis. The standardized canonical discriminant function coefficients are displayed in Figure A-2. The only variables not to enter the formula were the Hispanic and Anglo/Other binary ethnicity variables. Had one of these variables entered the analysis, the other would have been redundant. The discriminant function derived from the analysis was then used to classify all students as either dropouts or nondropouts. Figure A-3 shows that 77.6% of the students could be correctly classified using the discriminant function. The classification function coefficients used to determine whether students were classified or "high risk" or not are found in Figure A-4.

Step	Variable	Wilk's Lambda	Sig.	Minimum D Squared	Sig.
1	GPA	.770048	.0000	1.77643	.0000
2	GRADE	.752187	.0000	1.95986	.0000
3	BLACK	.744401	.0000	2.04259	.0000
4	DISCIPLINE	.741555	.0000	2.07326	.0000

Figure A-1 DISCRIMINANT ANALYSIS SUMMARY TABLE.

Variable	Standardized Coefficients	Unstandardized Coefficients
GPA	.85091	.1218994
GRADE	.31738	.6176198
BLACK	.23898	.6323207
DISCIPLINE	-.13395	- .1515758
SEX	-.12593	- .1259375
CONSTANT	-	-15.54711

Figure A-2. STANDARDIZED AND UNSTANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS.

Actual Group	N	Predicted Group Membership: Dropouts N	Dropouts %	Nondropouts N	Nondropouts %
Dropouts	649	453	69.8	196	30.2
Nondropouts	2,389	485	20.3	1,904	79.7

Percentage of cases correctly classified = 77.58

Figure A-3. CLASSIFICATION OF STUDENTS USING DISCRIMINANT FUNCTION DERIVED FROM ALL STUDENTS.

Variable	Classification Function Weights: Drop Out	Stay In
Sex	- .4361574	- .6189023
Grade	29.2481300	30.1443400
GPA	1.1530700	1.3299560
Discipline	5.4173950	5.1974470
Black Ethnicity	9.0095200	9.9270660
Constant	-171.426400	-193.383500

Figure A-4. CLASSIFICATION FUNCTION COEFFICIENTS. Students were classified as high risk if their score for dropping out exceeded their score for staying in.

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